Memorandum

To: Robert Garton, Chairperson
Legislative Council

From: Pete Baxter, Chairperson
Indiana State School Bus Committee

Re: School Bus Warning Lamp Study - Public Law 89-1999

Date: October 25, 1999

The 1999 Indiana General Assembly enacted P.L. 89-1999, authored by Representative Susan Crosby, directing the State School Bus Committee to review the existing state and federal requirements for the display of flashing yellow and red signal lamps by a school bus when coming to a stop to load or unload children. The State School Bus Committee was to evaluate whether the existing requirements are adequate to ensure children's safety or whether children's safety could be improved by requiring the earlier display of the flashing red signal lamps. In addition, the State School Bus Committee was to determine the feasibility of amending state laws and rules for requesting a change in federal regulations to require the earlier display of the flashing red signal lamps.

The study is attached for the Legislative Council's review. Summarized below are the main conclusions in the study.

- The State School Bus Committee believes the existing configuration and operation of yellow and red warning lamps used by a school bus to take on or discharge children provides more than adequate protection to children at bus stops. Highway users depend on the uniformity and consistency of messages, from traffic control devices, to aid in safe vehicle operation. Flashing yellow and red lamps have established well understood messages. It is common knowledge that the color yellow means caution and the color red means stop. The universal message of these colors is consistent; whether the lamp is part of a traffic control device (e.g., railroad crossing signal, a traffic light, or intersection flasher) or equipment on a vehicle (e.g., automobile 4-way hazard lights, fire truck, police car, school bus).

- There is no data to support the belief that motorists will take the authority of the school bus more seriously if the red flasher lights were activated earlier. However, we believe permitting earlier activation of the red lights is certain to <u>decrease</u> student safety at bus stops.

- Upon observing the yellow warning lamps, some motorists use this as an opportunity to <u>speed up</u> to avoid stopping for the bus. This is identical to their behavior when encountering the

yellow signal on the traffic light. Rhetorically speaking, why should we expect different behavior near a school bus? It is unrealistic to expect that equipment alone is the solution to improving student safety, when the larger issue is highway user behavior. Modifying the highway user's behavior is better accomplished through education, public service information, increased enforcement of existing school bus stop laws, continuous evaluation of school bus routes, and bus stop selection.

We believe the following countermeasures have merit in improving student safety at bus stops:

- Create and disseminate public service announcements for television, radio, and newspaper markets to educate highway users about the school bus stop law.

- Identify best practices and recommend that school districts establish safe school bus routes and stops.

- Design enforcement blitzes of the school bus stop law by law enforcement agencies.

- Implement student safety programs pertaining to loading zone safety and best practices at bus stops.

If further assistance is necessary please feel free to contact me by e-mail to *pbaxter@doe.state.in.us* or by telephone at 2-0891.

Attachment

c: Honorable Susan Crosby, State Representative
State School Bus Committee

SCHOOL BUS WARNING LAMP STUDY

Public Law 89-1999

Submitted by

Pete Baxter, Chairperson
State School Bus Committee

Prepared for

Robert Garton, Chairperson
Legislative Council

November 1, 1999

TABLE OF CONTENTS

SCHOOL BUS WARNING LAMP STUDY
(Public Law 89-1999)

Indiana State School Bus Committee

PUBLIC LAW 89-1999

The 1999 Indiana General Assembly enacted P.L. 89-1999 directing the State School Bus Committee to review the existing state and federal requirements for the display of flashing yellow and red signal lamps (see Appendix, Figure 1, page 12.) by a school bus when coming to a stop to load or unload children. The study will evaluate whether the existing requirements are adequate to ensure children's safety or whether children's safety could be improved by requiring the earlier display of the flashing red signal lamps. In addition, the study will determine the feasibility of amending state laws and rules for requesting a change in federal regulations to require the earlier display of the flashing red signal lamps.

RATIONALE

The State School Bus Committee believes the existing configuration and operation of yellow and red warning lamps used by a school bus to take on or discharge children provides more than adequate protection to children at bus stops. Highway users depend on the uniformity and consistency of messages, from traffic control devices, to aid in safe vehicle operation. Flashing yellow and red lamps have established well understood messages. It is common knowledge that the color yellow means caution and the color red means stop. The universal message of these colors is consistent; whether the lamp is part of a traffic control device (e.g., railroad crossing signal, a traffic light, or intersection flasher) or equipment on a vehicle (e.g., automobile 4-way hazard lights, fire truck, police car, school bus).

A moving school bus, with its red flashers engaged, would send conflicting messages to motorists about where and when to stop. For example, it is foreseeable that a school bus, with red flasher lights engaged, may drive past a stopped motorist to reach waiting students. This could create a dangerous situation because the motorist may not stop, believing that the school bus will continue to move. Further, a motorist may become confused and make less of an attempt to stop in the future because the red flashing lights do not fit within the accepted norm. Finally, there is no data to support the belief that motorists will take the authority of the school bus more seriously if the red flasher lights were activated

earlier. However, we believe permitting earlier activation of the red lights is certain to decrease student safety at bus stops.

Currently, school bus yellow and red flashing warning lamps, in conjunction with the stop signal arm, function the same as other traffic control devices. The flashing yellow lamps are activated in advance of a bus stop, conveying general CAUTION, with eventual stopping required. The flashing red lamps and stop signal arm are activated when the bus is stopped, conveying the sole message - STOP. Upon observing the yellow warning lamps some motorists use this as an opportunity to speed up to avoid stopping for the bus. This is identical to their behavior when encountering the yellow signal on the traffic light. Rhetorically speaking, why should we expect different behavior near a school bus? It is unrealistic to expect that equipment alone is the solution to improving student safety, when the larger issue is highway user behavior. Modifying the highway user's behavior is better accomplished through education, public service information, increased enforcement of existing school bus stop laws, continuous evaluation of school bus routes, and bus stop selection.

The *Manual on Uniform Traffic Control Devices* (MUTCD) states, "uniformity of traffic control devices simplifies the task of the road user because it aids in recognition and understanding."[1] The current configuration and operation of the school bus yellow and red warning lamps:

- command attention;
- convey a clear, simple meaning; and
- give adequate time for proper response.

The MUTCD supports the State School Bus Committee's assertion that the mixed message created by earlier activation of the red signal lamps will decrease student safety by stating, "uniformity means treating similar situations in the same way. A standard device used where it is not appropriate is as objectionable as a nonstandard device; in fact, this may be worse, in that such misuse may result in disrespect at those locations where the device is needed."[2]

Research into applicable federal laws and regulations supports the belief that the current configuration and operation of yellow and red flashers is adequate to ensure student safety at bus stops. The three federal acts pertaining to school bus flasher lamps are all based on the assigned meaning of traffic control device colors established by the MUTCD. The uniformity of these signals is essential to providing safe boarding and discharge of students at bus stops. Current Indiana statutes on school bus stop procedures further enhance the uniformity of these established meanings of yellow and red school bus flashers.

---

[1] U.S. Department of Transportation, *Manual on Uniform Traffic Control Devices*, March 1989, p.1A-2.

[2] Ibid., p. 1A-3.

The State School Bus Committee has long recognized the seriousness and high frequency of highway users who fail to obey school bus signals. In an effort to make the school bus more visible and ultimately reduce the number of highway users illegally passing a stopped school bus, the equipment items cited below are approved options. Each equipment item has demonstrated effectiveness in reducing stop arm violations. However, as the highway user becomes more familiar with the item, the effectiveness of the device diminishes.

- Additional stop signal arm mounted at rear left side of school bus.
- High intensity red strobe lamps in stop signal arm.
- Light emitting diode stop signal arm where the sign legend 'STOP' flashes. (See Appendix, Figure 2, page 12.)
- Alternating flashing headlamps, identical to the feature on police cars and ambulances.
- Currently evaluating video taping of stop signal arm violators.

In addition to the above optional equipment, the following countermeasures have merit in improving student safety at bus stops:

- Create and disseminate public service announcements for television, radio, and newspaper markets to educate highway users about the school bus stop law.
- Identify best practices and recommend that school districts establish safe school bus routes and stops.
- Design enforcement blitzes of the school bus stop law by law enforcement agencies.
- Implement student safety programs pertaining to loading zone safety and best practices at bus stops.

FEDERAL LAWS AND REGULATIONS

The three Federal acts pertaining to school bus operation and signals used at bus stops are listed below:

- U.S. Department of Transportation, National Highway Traffic Safety Administration, *Highway Safety Program Guideline No. 17, Pupil Transportation Safety.*

- U.S. Department of Transportation, National Highway Traffic Safety Administration, *Federal Motor Vehicle Safety Standards and Regulation*.

- U.S. Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways*.

Highway Safety Program Guideline No. 17, Pupil Transportation Safety, 23 CFR Part 1204

Guideline 17, formerly Standard 17, contains recommendations to the States on various operational aspects of their school bus and pupil transportation safety programs. The stated purpose of the Guideline is, "to minimize, to the greatest extent possible, the danger of death or injury to school children while they are traveling to and from school and school-related events."[3]

As an historical note, Highway Safety Program Standards were considered mandatory requirements until the middle 1980's with financial sanctions available for non-compliance. In 1987 Congress amended the Highway Safety Act, signaling that State highway programs must follow uniform 'guidelines' rather than 'standards' promulgated by the Secretary of Transportation.

The Guideline establishes certain color, signage, and equipment for school buses, such as a stop arm signal and signal lamps that conforms with the school bus requirements for Federal Motor Vehicle Safety Standard (FMVSS) No. 108 (Lamps, Reflective Devices, and Associated Equipment).

The Guideline also establishes operational expectations in that "each State should enact legislation that provides for uniform procedures regarding school buses stopping on public highways for loading and discharging children."[4]

Specific direction is provided to the States in the Guideline pertaining to the operation of the yellow and red flasher lamps required by FMVSS No. 108. The Guideline provides discretionary authority to the State for the use of the amber signal lamps. However, the red warning signal lamps used for "any purpose or at any time other than when the school bus is stopped to load or discharge passengers should be prohibited."[5] It is further recommended for school buses equipped with a stop signal arm to

---

[3] 23 CFR 1204, Highway Safety Program Guideline No. 17, *Pupil Transportation Safety*, II.

[4] Ibid., IV.C.2.a.

[5] Ibid., IV.C.2.c.

use the device only in conjunction with the red warning lamps when the vehicle is stopped.

Currently, Indiana statute, administrative rule, and school bus driver training curriculum are consistent with provisions of the Guideline.

Federal Motor Vehicle Safety Standards and Regulations, 49 CFR Part 571

Congress enacted the National Traffic and Motor Vehicle Safety Act[6] in 1966 to reduce traffic crashes, including deaths and injuries occurring in traffic accidents. The Secretary of Transportation is directed by this Act to establish Federal Motor Vehicle Safety Standards (FMVSS) to which vehicle manufacturers must conform and certify compliance. The following are two FMVSS relating to this study:

- FMVSS No. 108, *Lamps, Reflective Devices, and Associated Equipment*, specifies requirements to provide adequate illumination of the roadway and enhance conspicuity of motor vehicles on the highway.

Safety Standard 108 requires each school bus to be equipped with a system of four red signal lamps installed in accordance with Society of Automotive Engineers (SAE) Standard J887, School Bus Warning Lamps.[7] Four amber lamps are optional.

The purpose of SAE Standard J887 is to provide test procedures, requirements, and *guidelines for red and yellow school bus warning lamps.* [emphasis added] The Standard states the red warning lamps are, " . . . intended to inform other users of the highway that such vehicle is *stopped* on highway to take on or discharge school children."[8] [emphasis added] The yellow lamps indicate " . . . such vehicle is *about to stop* to take on or discharge children"[9] [emphasis added].

---

[6] Title 49, United States Code, Chapter 301.

[7] 49 CFR Part 571, FMVSS No. 108, Lamps, Reflective Devices, and Associated Equipment, S5.1.4.

[8] 1998 Society of Automotive Engineers Handbook, Volume 2, Parts and Components, Standard J887, #3.1 Definitions.

[9] Ibid., #3.2 Definitions.

School bus warning lamps command attention, convey a clear, simple meaning, and give adequate time for proper response.

- FMVSS No. 131, *School Bus Pedestrian Safety Devices*, specifies requirements for an octagon "STOP" sign (a.k.a. stop signal arm) to improve the safety of pedestrians in the vicinity of a stopped school bus.

Safety Standard 131 requires each school bus stop signal arm to automatically extend perpendicular to the bus body whenever the red signal lamps in Safety Standard 108 are activated.[10]

Indiana has utilized a combination of flasher lamps and a stop signal arm since the 1930's or 1940's to load or unload children at bus stops. Until 1988 our buses were equipped with four red lamps and a stop signal arm. The red lamps were activated prior to the bus stop, as directed by statute, to warn highway users that the bus was preparing to pickup or discharge students. The highway user was only required to stop upon display of the signal arm. This method of operation did not lessen the frequency of illegal pass-bys. In many instances the highway user would take the opportunity to speed up to avoid stopping for the bus. Although there is no data to support this claim, the assertion is substantiated by numerous complaints and reports from school bus drivers during annual statewide training sessions. We have no data or research showing student safety at bus stops will improve if red flashers are activated as the bus approaches a stop.

Manual on Uniform Traffic Control Devices for Streets and Highways

The *Manual on Uniform Traffic Control Devices for Streets and Highways*, (MUTCD), "sets forth the basic principals that govern the design and usage of traffic control devices."[11] The purpose of traffic control devices is to promote highway safety by establishing orderly and predictable movement of traffic. Traffic control devices include all signs, signals, markings, and devices placed by governmental entity on streets and highways to warn, regulate, or guide traffic.

Although the MUTCD's regulatory authority does not extend to school buses, the messages conveyed by school bus lamps and signals are identical to the established understanding and meaning of similar traffic control devices. An example is cited below:

---

[10] 49 CFR Part 571, FMVSS No. 131, School Bus Pedestrian Devices, S 5.5.

[11] U.S. Department of Transportation, *Manual on Uniform Traffic Control Devices*, March 1989, p.1A-1.

The MUTCD has established a color code for use in conveying traffic control information. The color yellow carries the meaning general warning, while the color red conveys the meaning stop or prohibition.[12]

The MUTCD states, "uniformity of traffic control devices simplifies the task of the road user because it aids in recognition and understanding."[13] The MUTCD supports our assertion that earlier activation of a school bus red signal lamps creates a mixed message for the motorist by stating, "uniformity means treating similar situations in the same way. A standard device used where it is not appropriate is as objectionable as a nonstandard device; in fact, this may be worse, in that such misuse may result in disrespect at those locations where the device is needed."[14]

INDIANA STATE LAW AND ADMINISTRATIVE RULE

Existing State Law

There are two statutes governing the use of school bus warning lamps and stop signal arm. They are cited below:

- IC 20-9.1-5-16 Sec. 16. Flashing lights, as prescribed by the state school bus committee, shall be used on every school bus, in order to give adequate warning that the bus is stopped or about to stop on the roadway to load or unload passengers. (Formerly: Acts 1973, P.L.218, SEC.2.) As amended by Acts 1977, P.L.123, SEC.8; P.L.135-1988, SEC.17.

- IC 20-9.1-5-14 Sec. 14. Arm Signal Device. (a) Whenever a school bus is stopped on a roadway to load or unload school children, the driver shall use an arm signal device, and the arm signal device shall be extended while the bus is stopped, except that a school bus driver need not extend an arm signal device when the school bus is stopped, at an intersection or other place where traffic is controlled by a traffic control device or a police officer. (Formerly: Acts 1973, P.L.218, SEC.2.) As amended by Acts 1977, P.L.123, SEC.7.

---

[12] Ibid., p.1A-8.

[13] U.S. Department of Transportation, *Manual on Uniform Traffic Control Devices*, March 1989, p.1A-2.

[14] Ibid., p.1A-3.

Existing Administrative Rule

The State School Bus Committee rule, cited below, specifies a system of yellow and red warning lamps to warn highway users that a school bus is stopping or has stopped on the roadway to pick-up or discharge students.

C 575 IAC 1-2-47, Lamps and signals, et. al., in part states,

"(e) An alternately flashing signaling system must alert other highway users that the bus is stopped or about to stop to take on or let off students. The system on each school bus ordered and initially placed in service on or after July 1, 1988, must meet the following specifications:
(1) The flashing signaling system must include the following equipment: A) Two (2) seven (7) inch red warning lights at the front and the rear of the bus. (B) In addition to the four (4) red lamps described above, one (1) amber lamp must be placed beside each of the four (4) red signal lamps.

These lamps must be closer than the red lamps to the longitudinal center line of the bus. While the red lamps must be automatically energized, the amber lamps must be manually energized and de-energized when the service door is opened. . . . (g) Each bus must have a stop signal device to indicate that the bus is stopped."

The existing state laws and administrative rule comply with the provisions of FMVSS and Highway Safety Guideline No. 17. The messages of the yellow and red lamps are consistent with the meanings established by similar traffic control devices.

Currently, school bus yellow and red flashing warning lamps, in conjunction with the stop signal arm, function identical to the expected meaning of similar traffic control devices. The flashing yellow lamps are activated in 800 to 400 feet in advance of a bus stop, conveying a message of general CAUTION and that stopping will be required. The flashing red lamps and stop signal arm are activated when the bus is stopped, conveying the sole message - STOP.

Upon observing the yellow warning lamps we understand some motorists use this as an opportunity to <u>speed up</u> to avoid stopping for the bus. It should be noted this is also the action that regularly occurred when school buses were equipped with only red warning flashers. Highway users would speed up to pass the bus when the red warning lamps were activated. They know the requirement is to obey the arm signal device, not the red flashers. The authority of the red light did not cause highway users to act more cautiously. Reverting to this style of bus stop procedure will <u>not decrease</u> the illegal pass-bys or improve student safety.

The authority of a flashing red light, by itself, will not improve student safety bus stops, when the larger issue is highway user behavior. Modifying highway user behavior is better accomplished through education, public service information, increased enforcement of existing school bus stop laws, and continuous evaluation of school bus routes and bus stop selection.

FEASIBILITY of AMENDING LAWS AND REGULATIONS

The General Assembly has authority to amend state law or to direct the State School Bus Committee to amend administrative rule requiring activation of the red warning lamps on a school bus prior to stopping. However, such a requirement, at the state level, will be in conflict with the render inoperative prohibition of FMVSS in federal law. As cited earlier FMVSS No.108 and No.131 require the red warning lamps to activate when the bus service door is opened, signaling the bus is stopped to pick-up or discharge students.

The National Traffic and Motor Vehicle Safety Act of 1966 states:

> No manufacturer, distributor, dealer, or motor vehicle repair business shall knowlying render inoperative, in whole or part, any device or element of design installed on or in a motor vehicle or item of motor vehicle equipment in compliance with an applicable Federal motor vehicle safety standard, unless such manufacturer, distributor, dealer, or repair business reasonably believes that such vehicle or item of equipment will not be used (other than for testing or similar purposes in the course of maintenance or repair) during the time such device or element of design is rendered inoperative.[15]

Therefore, to allow a school bus to display red warning lamps prior to stopping will require a change in FMVSS. The National Highway Traffic Safety Administration (NHTSA) has established procedures to petition rulemaking. The procedures are found in Title 49 CFR Part 552, Petitions For Rulemaking, Defect, and Noncompliance Orders.

In order to proceed with an amendment to FMVSS, the petitioner is required to "set forth facts which it is claimed establish that an order is necessary."[16] There is no collaborating data or evidence, in Indiana or other states, to support that student safety at bus stops is increased with earlier activation the red

---

[15] 15 U.S.C. 1381, Public Law 89-563, Title I, *Motor Vehicle Safety Standards*, Section 108(a)(2)9A).

[16] 49CFR Part 552.4(c), Petitions For Rulemaking, Defect, and Noncompliance Orders, Requirements for Petition.

warning lamps. Thus, it is unlikely that the NHTSA will respond favorably to a rulemaking petition on this subject.

CONCLUSION

In conclusion, the School Bus Committee believes student safety at a bus stop can be improved by the:

- Creation and dissemination public service announcements for television, radio, and newspaper markets to educate highway users about the school bus stop law.
- Identification of best practices and the recommendation to school districts that safe school bus routes and stops are established.
- Development of enforcement blitzes of the school bus stop law by law enforcement agencies.
- Implementation of student safety programs pertaining to loading zone safety and best practices at bus stops.

APPENDIX

APPENDIX: ILLUSTRATIONS

Figure 1. Current configuration of yellow and red warning flasher lights.

Figure 2. Light emitting diode stop signal arm. The word “stop” flashes.

APPENDIX: ROSTER

State School Bus Committee

Roster of Members / Organization Representing

1. Pete Baxter, Chairperson, Indiana Department of Education
2. Ron Chew, Indiana Association of School Bus Drivers
3. Mike Fendley, School Transportation Association of Indiana
4. Kenton Gearhart, Governor's Council On Impaired and Dangerous Driving
5. Richard Kerby, Indiana Association of Public School Superintendents
6. John Rahn, Indiana Department of Health
7. Alfred Stout, Indiana School Boards Association
8. Jim Poe, Indiana Department of Revenue
9. Larry Sherman, Indiana State Police
10. Bob Merchanthouse, Indiana Association of School Bus Distributors
11. Judith Dahlstrom, Indiana Transportation Association
12. David Layton, Indiana Township Trustee's Association

BIBLIOGRAPHY

BIBLIOGRAPHY

Federal Motor Vehicle Safety Standards and Regulations, U.S. Government Printing Office, 1966.

Highway Safety Program Guideline No. 17, U.S. Government Printing Office, 1992.

Manual on Uniform Traffic Control Devices, U.S. Government Printing Office, 1988.

Society of Automotive Engineers, SAE, Pennsylvania.1998.

State of Indiana, General Assembly, I.C. 20-9.1-5-16, 1988.

State of Indiana, General Assembly, I.C. 20-9.1-5-14(a), 1977.

United States of America, U.S. Congress, P.L. 89-563, 1966.